USAGE OF WASHED COAL IN INDIA: ISSUES AND CHALLENGES

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BACKGROUND

Thermal Coal (30-45-50% Ash) Production in 2006-07: ~429 MT
Thermal Coal Production in 2011-12 Could be even >600 MT

Coal (+ middlings) use in power plant in 2006-07: ~352 MT
Coal use in power plants in 2011-12 could be up to 540 MT

Assuming 55% share of the total generation, by 2012, a capacity addition of 55000MW would be required from coal - fired plants Involves an investment of Rs220000crores @±Rs4crores per MW (~US$1.0 million per MW).

Power Coal Beneficiation (CB) need under current legislation (<34% ash for >1000 KM distance):

In 2006-07	148 MT
In 2011-12	~216 MT

Installed CB Capacity in 2006: ~50 MT (<15% of the coal produced); Proposal to add 21.5 Mt in the next few years

Beneficiated coal produced in 2006-07 ~17 - 18 MT

~40% of installed capacity utilised

Assuming an ideal but modest prognosis for 2011-12, ~216 MT would have to be beneficiated coal.

Assuming a gross 80% yield, minimum installed capacity requirement would be ~175 MT, 3.5times the existing capacity

IMPLICATIONS

Opportunity for generating large number of direct and indirect jobs

Opportunity for bringing in massive environmental rewards

Let's restate a short and quick list of well – known benefits of CB –

- Producer gets better value for his product
- Transporter does not haul unnecessary stuff
- Consumer (power plants) gets consistent quality of product
- Consumer (power plants) increases generation by 2-3%
- Consumer reduces generation cost by reducing maintenance, ash handling and emission control cost
- Public gets more reliable power supply (less maintenance breakdown of power plants) at less cost
- Environment gains due to reduced ash, particulates, CO_2 emission
- It should be a no-brainer to start building more CB plants and to start using beneficiated coal only.

BUT IT'S NOT HAPPENING. WHY?

SPECIFIC ISSUES

This paper is an attempt to identify a few of those causes, discuss various stake-holders, often conflicting stakes, and to suggest some solutions.

Coal Pricing Criteria

The broad banded UHV dependent, "grade" based, pricing system is a deterrent to beneficiation. Example below

Clean Coal Ash, %	Barmuri; OCM; Mugma Area; ECL			Saristhali; OCM; CESC Salanpur - Jamunia;			Ghorawari; UG Kanhan Area; WCL		
	UHV	Grade	GCV	UHV	Grade	GCV	UHV	Grade	GCV
30	4612	D	5797	4430	D	4931	4240	D	5214

Gradation of Non-Coking Coal in India and the Resultant Dilution

	UHV	Ash % Range	% Dilution	UHV Dif. at 0.1% ash Diff.
A	>6200	18.6 ≤		
B	>5600 to ≤6200	22.9-18.6	23.1	12
C	>4940 to ≤5600	27.7-22.9	21.0	14
D	>4200 to ≤4940	33.1-27.7	19.5	20
E	>3360 to ≤4200	39.1-33.1	18.1	8
F	>2400 to ≤3360	46.1-39.1	17.9	14
G	>1300 to ≤2400	54.1-46.1	17.4	18

- **Assuming a typical M=1% and VM > 19%, taking minimum UHV value of any grade as the basis the existing grade based pricing system has an inbuilt mining dilution of 17.5-23%. If we add another modest 10% unintentional dilution and also modestly 10% more dilution on account of the widespread existence of bands in the coal seams currently being mined, we get a staggering figure of 37.5 – 43% mining dilution.**

- **In practical terms, a power plant paying for 100tonnes of coal actually gets around 60tonnes only. On the other hand, assuming again a typical M=1% and VM > 19%, just 0.1% ash difference and therefore a UHV difference of only 8-20 kcal/ kg can make or slip a grade. Price differences between the grades are not small and generally are in the range of Rs120 – 150 (US $2.9-3.7) per tonne**

The cost of energy per unit at pithead for domestic coal and at port for imported coal comes out approximately as Rs0.66 (1US$=Rs41) for domestic coal and Rs1.57 for imported coal. Since, the grades camouflage the hidden ash range, the under-pricing appears to be a direct fall out of the current pricing system. It also seems to be in our mind set that Indian coals, because of their high ash, cannot be priced high.

Changing from current UHV based pricing to the universally accepted practice of pricing by GCV will be beneficial to the producer as well and will have a catalytic effect of encouraging beneficiation. Furthermore, currently in order to make washing profitable, the coal has to be beneficiated enough to move up 2 grades, reducing the ash content by ~10%. Quite often this is neither feasible nor economical. GCV based pricing will overcome this unnecessary criteria.

Any change in the pricing policy and structure will disturb the current and in some cases long standing policies and practices of many stake-holders like the producer, consumer, sampling agencies, transporters, etc. A whole new set of policies and practices have to be developed causing discomfort and expense at various levels and sub-levels.

Coal Beneficiation Plant Operator's Role

The current practice of using the plant operator as a captive subcontractor of the consumer (power plant) appears to be another deterrent to beneficiation.

The current practice of a fixed washing cost and a fixed output criteria, without any regard for the incoming coal quality, is discouraging many prospective operators to get into the field. Switching over to GCV based pricing should automatically take care of this problem.

The operator should be allowed to decide the best product he can produce and the best price he can offer. Furthermore, the existing policy on "washery rejects" needs to be re-examined, because, switching over to GCV based pricing would ensure that washeries do not "produce rejects", which could be sold as "G grade coal".

Coal Beneficiation Cost

It has been used as an excuse as a deterrent to beneficiation.

It has been reported that the washing cost may be as high as Rs160 per ton ($3.56/ton). It has also been reported that a leading coking coal producer in the private sector with more intensive washing (-15mm coal: DMC + Flotation + Dewatering) and is known to wash coal at Rs100-120/ton ($2.22 - $2.67/ton).

Moreover, there is every reason to believe, that given enough market opportunity and perhaps the existence of a price regulatory body, this cost will comedown to well below Rs80/ton ($1.78/ton).

Electricity Cost

A simplistic notion of higher electricity cost coming from the additional cost of washing has been a pseudo-deterrent to beneficiation. With the ever - increasing Government emphasis on rural and urban slum electrification with concurrent withdrawal of subsidy, who would bear the additional cost? This is a frequently asked question, because 60-70% of the coal fired power is generated by the State Government owned companies, where generation cost appears to be 2-3-4 times the best Indian practice.

In reality the generation cost has actually gone down (according to many studies) because of lesser maintenance and emission control as well as ash disposal cost.

Here again the conflicting stakes of various stake-holders may come into play; maintenance industry, ash disposal industry and emission control (ESP, Cyclones, Filter Bags) industry may be adversely affected, just to name a few.

Metallurgical Coal Recovery

Because of demand – supply gap coal blends in SAIL plants are reported to have a ratio of 70 to 30 between the imported and domestic. At the same time, of the 25.1Bt coking coal reserves of the country as on 1January 2002, about 18.0Bt belong to low volatile coking coal (LVC) variety. Most of these coals are currently being sold to power plants after de-shaling at ≤34% ash or as ROM coal with 35-45% ash.

Apparent disheartening performance of the industry in the processing of small and fine coking coal has become a deterrent to LVC beneficiation. It has been further worsened due to our inability to take corrective actions over the "expert's" designs.

However, there are about 10-15 private "mini flotation plants" in coking coal belt, with a combined installed capacity of about 250TPH. They get their feeds, 35-50% ash flotation tailings, from large capacity washeries. Through secondary flotation, these mini plants obtain a yield of 40-60% at 14-16% ash. About 20-30% yield is obtained in some of the plants at 8-11% ash. Reagent cost is lower by about 20-30%. Dewatering units used in these plants include settling tanks or Dorr thickeners and vacuum disc filters. Final concentrate moisture is around 20%.

We should take up the challenge of doing efficient flotation and dewatering of fines in larger scale because flotation and dewatering characteristics of Indian coal fines are vastly different from the coals of other countries.

We need not be scarred to disturb the finely balanced status quo developed over the decades in the coal slurry business involving about fifty thousand people and through their families affecting the lively hood of about a quarter million people?

This is another issue we need to address to.

SUMMARY

Technology availability does not appear to be a constraint in the growth of "power" coal washing and in the processing of small and fine coking coal in India. Yet, power coal washing is not gaining the momentum and coking coal washing is at best limping.

In this author's opinion, the barriers to the major expansion of coal beneficiation industry and usage of washed coal in India is:

With a highly compartmentalised approach, our collective reluctance (or inability) to look at the big arena of coal beneficiation well beyond specific technological and direct cost problems

Our collective reluctance (or inability) to take bold (albeit to some extent risky) initiatives in technology and policy area

Our collective reluctance (or inability) to identify various stake-holders and their – often conflicting --stakes

Our collective acceptance (albeit with increasingly great discomfort) of a delicately balanced status-quo of techno-socio-economic-political ground reality

It will not be possible to bring a major change in the power coal as well as coking and fine coal washing scenario without addressing these issues, specially the apprehensions or concerns of various stake-holders.

We must take a holistic view of the situation.

We have to find a way to overcome these obstacles so that the largest stake-holder, the people of India (and of the world) gets the maximum benefit.

“where the mind is without fear and the head is held high, where knowledge is free” – Tagore

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